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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/530,493	04/06/2005	Motokazu Kobayashi	03500.017633	4722

5514 7590 03/21/2007

FITZPATRICK CELLA HARPER & SCINTO
30 ROCKEFELLER PLAZA
NEW YORK, NY 10112

EXAMINER	
LEWIS, BEN	
ART UNIT	PAPER NUMBER
1745	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/530,493	KOBAYASHI ET AL.	
	Examiner	Art Unit	
	Ben Lewis	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 April 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/6/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 2 recites the limitation "the same one pixel." There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-6 and 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hulett (U.S. Patent No. 6,074,692) and further in view of Hampden-Smith et al. 7,138,354 B2).

With respect to claims 1 and 10, Hulett teach a method of making MEA for PEM/SPE (title) wherein the process includes the principal steps of (a) preparing an electrode-forming slurry comprising finely divided catalyst, a polymer binder for the catalyst, and a liquid vehicle for the catalyst and binder, (b) coating a proton-conductive, polymeric membrane-electrolyte with the slurry to form a slurry-coated membrane (Col 3 lines 15-45). Hulett also teach that coating of the slurry is best accomplished by air atomized spraying, liquid nozzles, or slot coating which do not require applicators contacting the membrane-electrolyte. It is also possible to use known printing techniques including screen printing, dip coating, flexography, or other roll coating techniques but care must be taken not to damage the membrane-electrolyte. Most preferably, coating is accomplished using banks of air-atomized spray nozzles available from Binks, Co., Nordson Co., Paasche Inc., or other spray equipment companies (Col 7 lines 26-43). Hulett does not specifically teach coating using an ink-jet process. However Hampden-Smith et al. disclose a method for the fabrication of an electrocatalyst layer (title) wherein the electrocatalyst powders of the present invention are also useful in fuel cells. FIG. 37 illustrates a schematic cross section of a membrane electrode assembly for a fuel cell according to an embodiment of the present invention. The membrane electrode assembly **550** comprises an anode **552** and cathode **554** which are typically constructed from carbon cloth. The anode **552** and cathode **554** sandwich a catalyst layer **556** and **558** on each side of a proton exchange membrane **560** which can be fabricated from a material such as Nafion 117 (Col 35 lines 4-25).

With respect to conductive particles, Hampden-Smith et al. teach that in some cases it may be desirable to combine the metal and metal oxide phases into a single layer to take advantage of multiple functions. For example, it may be advantageous to combine the electrocatalyst layer with the current collector layer. In this case an electronically conductive layer containing a metal or metal oxide catalyst is necessary (Col 6 lines 5-20). Hampden-Smith et al. also teach that the electrocatalyst powders of the present invention can be deposited onto device surfaces or substrates by a number of different deposition methods which involve the direct deposition of the dry powder such as dusting, electrophotographic or electrostatic precipitation. Other deposition methods involve liquid vehicles such as ink-jet printing, syringe dispense, toner deposition, slurry deposition, paste-based methods and electrophoresis. In all these deposition methods, the powders according to the present invention have a number of advantages over the powders produced by other methods. For example, small, spherical, narrow size distribution particles are more easily dispersed in liquid vehicles, they remain dispersed for a longer period of time and allow printing of smoother and finer features compared to powders made by alternative methods (Col 35 lines 45-60). Printing methods "ink-jet" can also facilitate better control over the construction of interfaces and layer compositions giving rise to tailored gradients in composition and layer surface morphology that facilitate chemical transport and electrochemical reactions (Col 38 lines 20-30).

Hampden-Smith et al. teach that each drop generated by the ink-jet head includes approximately 2 to 200 picoliters of the liquid that is delivered to the surface (Col 42 lines 40-50).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the ink-jet process of Hampden-Smith et al. for application of a catalyst layer of Hulett because Hampden-Smith et al. teach that printing methods "ink-jet" can also facilitate better control over the construction of interfaces and layer compositions giving rise to tailored gradients in composition and layer surface morphology that facilitate chemical transport and electrochemical reactions (Col 38 lines 20-30)

With respect to claims 2,5 and 10, Hampden-Smith et al. teach that it may be advantageous to print the layers containing the electrocatalyst powders of the present invention using a direct-write device. There are a number of advantages of constructing an energy device such as a battery or fuel cell using printing methods. Printing methods enable the formation of layers "plurality of coatings" that are thinner and with smaller feature sizes than those that can be produced by current manufacturing methods such as rolling and pressing. The thinner layers result in reduced mass and volume and therefore an increase in the volumetric and gravimetric energy density of the battery (Col 38 lines 1-20). Thinner layers can also facilitate faster transport of chemical species such as ions, electrons and gases "gas diffusion" due to the reduced diffusional distances. This can lead to improved battery performance where, for

example, the diffusion of a chemical species is otherwise a rate limiting factor (Col 38 lines 10-20).

With respect to claim 3, Hampden-Smith et al. teach that each drop generated by the ink-jet head includes approximately 2 to 200 picoliters of the liquid that is delivered to the surface (Col 42 lines 40-50).

With respect to claim 4 Hulett teach that the catalyst slurry was sprayed on both sides of the membrane to obtain a wet thickness of 125 microns (Col 8 lines 1-26)

With respect to claims 6 and 11, Hampden-Smith et al. teach that the composite electrocatalyst powders include a secondary support phase consisting of agglomerates of smaller primary particles such as carbon or metal oxide which supports the active species. Two or more types of primary particles can be mixed to form the secondary support phase. As an example, two or more types of particulate carbon (e.g., amorphous and graphitic) can be combined to form the secondary support phase (Col 11 lines 5-15).

With respect to claim 12, Hampden-Smith et al. teach that the anode **552** and cathode **554** sandwich a catalyst layer **556** and **558** on each side of a proton exchange membrane **560** which can be fabricated from a material such as Nafion 117 (Col 35 lines 4-25).

6. Claims 7 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hulett (U.S. Patent No. 6,074,692) in view of Hampden-Smith et al. 7,138,354 B2) as applied to claims 1 and 8, and further in view of Kurzweil et al. (U.S. Patent No. 5,955,215).

With respect to claim 7, Hulett as modified by Hampden-Smith et al. disclose a fuel cell in paragraph 2 above. Hulett as modified by Hampden-Smith et al. do not specifically teach housing which houses the fuel cell. However, Kurzweil et al. disclose a bipolar electrode-electrolyte unit (title) wherein depending on the application, stack 11 can be placed in a housing that provides electrical and mechanical protective functions. The cell can be charged from an external power source 8 or discharged by an external consumer (Col 2 lines 52-64). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the placement of the fuel cell unit in a housing of Kurzweil et al. on the fuel cell system of Hulett as modified by Hampden-Smith et al. because Kurzweil et al. teach that a housing that provides electrical and mechanical protective functions (Col 2 lines 52-64).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben Lewis whose telephone number is 571-272-6481. The examiner can normally be reached on 8:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ben Lewis

Patent Examiner
Art Unit 1745

SUSY TSANG-FOSTER
PRIMARY EXAMINER